CLAIMS

1. A method for compensating for the chromatic dispersion in optical systems, the method comprising the steps of:

separating input optical radiation into distinct chromatic components;

propagating said distinct chromatic components through the optical system, said propagating including the steps of:

reflecting said distinct chromatic components; and,

providing, through said reflecting, a pre-selected relationship between optical path lengths of said distinct chromatic components, said pre-selected relationship substantially compensating for the chromatic dispersion;

recombining said distinct chromatic components, after propagating through the optical system.

2. The method of claim 1 wherein the step of reflecting said distinct chromatic components further comprises the step of:

reflecting said distinct chromatic components from a volume optical reflector.

3. The method of claim 1 wherein the step of reflecting said distinct chromatic components further comprises the step of:

reflecting said distinct chromatic components from a switchable pixellated holographic mirror.

4. The method of claim 1 further comprising the step of:

focusing the input optical radiation.

5. The method of claim 1 wherein the step of separating input optical radiation into distinct chromatic components comprises the step of:

propagating the input optical radiation through at least one separating diffraction grating.

6. The method of claim 5 wherein the step of recombining said distinct chromatic components comprises the step of:
propagating the distinct chromatic components through at least one recombining diffraction grating.

7. The method of claim 6 wherein said at least one recombining diffraction grating is the same as said at least one separating diffraction grating.

8. A chromatic dispersion compensated optical system comprising:
an optical separating sub-system capable of separating input optical radiation into distinct chromatic components;

an optical recombining sub-system capable of recombining said distinct chromatic components for output; and,

a volume optical reflector capable of reflecting said distinct chromatic components and providing, through said reflecting, a pre-selected relationship between optical path lengths through the optical systems of said distinct chromatic components, said pre-selected relationship substantially compensating chromatic dispersion.

9. The optical system of claim 8 further comprising:
a switchable element selected from the group consisting of a switchable grating, a switchable mirror array, a switchable liquid crystal array, a cross-connect, an add-drop multiplexer, an interleaver and a band channelizer;

said switchable element optically interposed between said volume optical reflector and said optical recombining sub-system.

10. The optical system of claim 8 further comprising:
an optical focusing component capable of focusing separated input optical radiation onto the volume optical reflector.

11. The optical system of claim 8 wherein said volume optical reflector comprises a pixellated switchable holographic mirror.

12. The optical system of claim 8 wherein said optical recombining sub-system is the same as said optical separating sub-system.

13. The optical system of claim 9 further comprising:
a directing optical element capable of directing the separated input optical radiation to the pixellated optical reflector; and,

a redirecting optical element capable of redirecting optical radiation reflected from the pixellated optical reflector to the switchable element.

14. A chromatic dispersion compensated optical system comprising:
a pair of separating diffraction gratings capable of separating input optical radiation into distinct chromatic components;

a pair of recombining diffraction gratings capable of recombining said distinct chromatic components;

an optical reflector capable of reflecting said distinct chromatic components and providing, through said reflecting, a pre-selected relationship between optical path lengths of said distinct chromatic components through the optical system, said pre-selected relationship substantially compensating chromatic dispersion; and,

a switchable element capable of receiving the separated distinct chromatic components and outputting separated distinct output chromatic components;

said switchable element optically interposed between said optical reflector and one of said pair of recombining diffraction gratings.

15. The optical system of claim 14 wherein the switchable element comprises:

a switchable element selected from the group consisting of a switchable grating, a switchable mirror array, a switchable liquid crystal array, a cross-connect, an add-drop multiplexer, an interleaver and a band channelizer.

16. The optical system of claim 14 further comprising:

an optical focusing component capable of focusing separated input optical radiation onto the optical reflector.

17. The optical system of claim 14 wherein said pair of recombining diffraction gratings is the same as said pair of separating diffraction gratings.

18. The optical system of claim 9 further comprising:

a directing optical element capable of directing the separated input optical radiation to the optical reflector;

a redirecting optical element capable of redirecting optical radiation reflected from the optical reflector to the switchable element.

19. The optical system of claim 8 wherein said optical separating sub-system comprises:

a pair of diffraction gratings.

20. The optical system of claim 8 wherein said optical recombining sub-system comprises:
a pair of diffraction gratings.

21. The optical system of claim 8 wherein said volume optical reflector comprises a phase conjugate mirror.